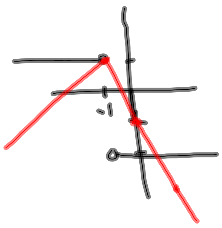
27. f from f'

$f(0) = -1$

$$f'(x) = \begin{cases} 1, & x < -1 \\ -2, & x > -1 \end{cases}$$



Sep 4-9:19 AM

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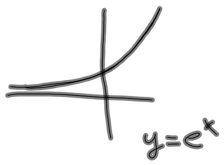
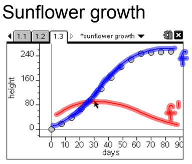


Sep 4-9:28 AM

3.1b Derivative as a function - numerically and algebraically

Sunflower growth

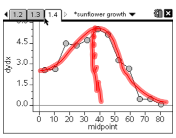


days	height	midpoint
0	0.	3.5
7	17.93	10.5
14	36.36	17.5
21	67.76	24.5

C1 $=a1+\frac{a2-a1}{2.}$

days	height	midpoint	dydx
0	0.	3.5	2.56143
7	17.93	10.5	2.63286
14	36.36	17.5	4.48571
21	67.76	24.5	4.33429

D1 $=\frac{b2-b1}{a2-a1}$



When is the sunflower growing the fastest?

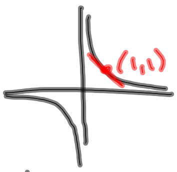
between 35 & 42 days

How fast? $\frac{\Delta y}{\Delta x} = \frac{169.5-131}{42-35}$

$= 5.5 \frac{cm}{day}$

Sep 9-10:16 PM

Find the derivative of y=1/x at x=1   slope at a point $x=a$



$$\lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

$$\lim_{h\to 0} \frac{f(1+h)-f(1)}{h} = \lim_{h\to 0} \frac{\frac{1}{1+h} - \frac{1}{1}}{h}$$

$$\lim_{h\to 0} \frac{\left[\frac{1-(1+h)}{(1+h)\cdot 1}\right]}{h} = \lim_{h\to 0} \frac{\left[\frac{-h}{1+h}\right]}{h} = \lim_{h\to 0} \left[\frac{-h}{1+h}\right] \cdot \frac{1}{h}$$

$$\lim_{h\to 0} \frac{-1}{1+h} = -1$$

slope of $y=\frac{1}{x}$ at $x=1$

Sep 9-10:41 PM

Find the derivative of $y=\sqrt{x+2}$ at x=7

$$\lim_{h\to 0} \frac{f(7+h)-f(7)}{h}$$

$$\lim_{h\to 0} \frac{\left(\sqrt{9+h}-\sqrt{9}\right)}{h}\frac{\left(\sqrt{9+h}+\sqrt{9}\right)}{\left(\sqrt{9+h}+\sqrt{9}\right)}$$

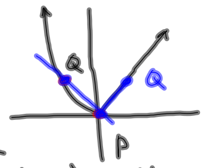
$$\lim_{h\to 0} \frac{(\cancel{9}+\cancel{h})-\cancel{9}}{\cancel{h}\left(\sqrt{9+h}+\sqrt{9}\right)} = \lim_{h\to 0}\frac{1}{\sqrt{9+h}+\sqrt{9}} = \frac{1}{6}$$

Sep 10-11:27 AM

One-sided derivatives

Show that the following function has a left hand and a right hand derivative at x=0, but no derivative there.

$$f(x)=\begin{cases} x^2 & x\le 0 \\ 2x & x>0 \end{cases}$$



lhd

$$\lim_{h\to 0^-} \frac{f(0+h)-f(0)}{h}$$

$$\lim_{h\to 0} \frac{h^2-0}{\cancel{h}} = 0$$

lhd $f'=0$

rhd $f'=2$

$f'(0)$ dne

$$\lim_{h\to 0^+} \frac{f(0+h)-f(0)}{h}$$

$$\lim_{h\to 0^+} \frac{2h-0}{h} = 2$$

Sep 10-11:33 AM

Sep 4-10:21 AM